REMARKS

Applicant respectfully requests reconsideration of this application as amended. Claims 1-3, 5, 6, 9-12, and 15-17 are currently pending in this application. This Amendment is submitted in response to the Final Office Action mailed October 30, 2006. In this Amendment, the claims are not amended. No new matter is added by this Amendment. Further, Applicants submit that this Amendment does not necessitate new search and as such, should be entered.

Response to Examiner's remark

The examiner pointed out that the current specification discloses *"The bulk heat dissipation substrate can also be deposited by a direct bonding method ..."* (Paragraph [0030], lines 12-14. Underlined provided by applicant.), which implies that direct bonding is a method of deposition.

Applicant submits that the word "deposited" as used in the above mentioned sentence carries a common meaning of "placed" or "formed", which is different from the technical meaning of the word "deposition" used elsewhere in the specification.

According to Merriam-Webster Online Dictionary:

Main Entry: deposit
1 : to place especially for safekeeping or as a pledge
2 a : to lay down : PLACE
b : to let fall (as sediment)

In contrast, the word "deposition" used in many technical fields to describe various different processes (according to Wikipedia, the online encyclopedia):

In chemistry, deposition is molecules settling out of a solution.
In physics, deposition is the process of gas transformation into solid.
In Aerosol physics, deposition is a process, where aerosol particles set down onto surfaces.
...

Applicant submits that in semiconductor processing, deposition has a hybrid meaning between chemistry and physics, and is commonly regarded as a process of gas or liquid transformation into solid. An example of deposition employing gas transformation

into solid is chemical vapor deposition process where precursor vapors transform into a thin solid film on a substrate. An example of deposition employing liquid transformation into solid is spin-on deposition where a liquid is spun on a substrate with an optional baking process to form a thin solid film.

Applicant submits that the meaning of the above quoted sentence (the substrate is deposited to the wafer by direct bonding) is that the substrate is formed on the wafer by placing and bonding. Thus applicant respectfully submits an amendment for this sentence for clarification. Specifically, the word "deposited" is replaced with the word "formed".

Claim Rejections - 35 U.S.C. §102(e)

Claims 1-3, 5, 6, 9-12, and 15 have been rejected under 35 U.S.C. §102(e) as being anticipated by Kub et al. (U.S. Patent Publication No. 2004/0224482).

Response to 35 U.S.C. §102(e) rejections

With regard to the rejection of claims 1-3, 5, 6, 9-12, and 15 under 35 U.S.C. §102(e) as being anticipated by Kub et al. (U.S. Patent Publication No. 2004/0224482), applicant submits that Kub et al. does not discloses an element of the present application, namely "depositing a bulk heat dissipating handle substrate onto the semiconductor donor substrate, the bulk heat dissipating handle substrate having a thermal conductivity greater than that of said semiconductor substrate".

Applicant submits that the present invention discloses a step of depositing a handle substrate, defined as to provide the ability *"to withstand handling during processing"* (Paragraph [0026], line 3 from bottom). An exemplary method according to the present invention deposits a handle substrate having a thickness *"between 750 μm and 800 μm"* to allow processing a thin semiconductor donor layer (Paragraph [0025], line 7 from bottom). Further, the handle substrate according to the present invention has a thermal conductivity greater than that of said semiconductor substrate.

In contrast, applicant submits that the invention of Kub et al. is directed toward bonding a handle substrate. The examiner states that the element of *"depositing a bulk heat dissipating handle substrate onto the semiconductor donor substrate, the bulk heat*

dissipating handle substrate having a thermal conductivity greater than that of said semiconductor substrate" is disclosed by Kub et al. through the deposition of the optional stiffening layer 17.

Applicant respectfully disagrees. Firstly, the stiffening layer 17 is disclosed by Kub et al. as optional, meaning it is not an indispensable component. Thus applicant submits that the optional stiffening layer 17, as disclosed by Kub et al., is not meant to be the handling substrate, which is an indispensable component for the fabrication process for handling the product.

Secondly, Kub et al. fails to teach that the stiffening layer 17 is the handle substrate. Besides stating that the stiffening layer 17 is an optional layer, Kub et al. further discloses that the handling substrate is the flexible substrate 16, with the specification disclosing a process of transferring the thin film to a flexible substrate (Paragraph [0017], first sentence).

Thirdly, Kub et al. fails to teach that the stiffening layer 17 has a thermal conductivity greater than that of the semiconductor substrate. The examiner pointed out that Kub et al. expressly discloses the material of SiC, and that it can be used. However, applicant submits that Kub et al. discloses SiC for its stiffness property, and not for its thermal conductivity.

Applicant submits that an element of the claim 1 of the present invention is that the handle substrate has a thermal conductivity greater than that of the semiconductor substrate. Claim 2 then discloses that a material that satisfies this thermal conductivity requirement is SiC.

In contrast, Kub et al. discloses a stiffening layer 17, and a material that satisfies this requirement is SiC.

Thus applicant submits that the expressly disclosure of Kub et al. of using SiC material does not anticipate claim 1 of the present invention of a handle material having thermal conductivity greater than that of semiconductor substrate.

In sum, applicant submits that Kub et al. does not disclose an element of the present invention, namely *"depositing a bulk heat dissipation handle substrate onto the semiconductor donor substrate, the bulk heat dissipation handle substrate having a*

thermal conductivity greater than that of the semiconductor substrate", and therefore the present invention cannot be anticipated from Kub et al.

Claim Rejections - 35 U.S.C. §103(a)

Claims 1-3, 5, 6, and 9-12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kub et al. (U.S. Patent No. 6,323,108) in view of Ghyselen et al. (U.S. Patent No. 6,867,067).

Claims 15 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kub et al. (U.S. Patent No. 6,323,108) in view of Letertre et al. (U.S. Patent No. 6,815,309).

Claim 17 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Kub et al. (U.S. Patent No. 6,323,108) and Letertre et al. (U.S. Patent No. 6,815,309) as applied to claim 15 above, and further in view of Lam et al. (U.S. Patent Publication No. 2005/0060115).

Response to 35 U.S.C. §103(a) rejections

Regarding claims 1-3, 5, 6, and 9-12 under 35 U.S.C. §103(a) as being unpatentable over Kub et al. (U.S. Patent No. 6,323,108) in view of Ghyselen et al. (U.S. Patent No. 6,867,067), applicant submits that deposition and direct bonding are two distinct and generally unexchangeable methods, thus it is not obvious to replace a direct bonding process of Kub et al. with a deposition process as taught by Ghyselen et al.

The examiner pointed out that the specification states that *"The bulk heat dissipation substrate can also be deposited by a direct bonding method ..."* (Paragraph [0030], lines 12-14. Underlined provided by applicant.), which provides the implication that bonding is a method of deposition, and thus the deposition process is an alternate method to direct bonding.

Applicant respectfully disagrees. As stated above, applicant has amended the specification to remove the ambiguity of the word "deposited" in this sentence. Applicant submits that the word "deposited" used in this sentence identifies that the bulk heat dissipation substrate can also be formed by a direct bonding method.

Applicant submits that deposition and direct bonding are two distinct methods not in the same class to be used interchangeably since the applications and processes of these two techniques are generally quite different.

Direct bonding method is the process of bonding two substrates together, which is a physical and macroscopic process. The bonding process typically employs a glue layer or Van der Walls force. The bonding process also tends to be a macroscopic process where the two substrates are measured in terms of mm in order to be handled by operators or machines.

Deposition is the process of growing a thin film on a substrate, which a chemical process of transforming a gas or liquid to a solid thin film. Deposition also tends to be a microscopic process where the growing thickness is measured in terms of micron.

Thus applicant submits that deposition is not an alternate method of direct bonding, and the skills needed for a deposition process is different and distinct from the skills required for direct bonding. Generally speaking, a person skilled in the art of direct bonding would not be skilled in the art of deposition, or would not even be aware of the deposition process. Thus applicant submits that it is not obvious to persons skilled in the art of direct bonding method to employ the art of deposition as taught by Ghyselen et al. as a substitute to the direct bonding process of Kub et al.

With respect to the rejection of claims 15 and 16 under 35 U.S.C. §103(a) as being unpatentable over Kub et al. (U.S. Patent No. 6,323,108) in view of Letertre et al. (U.S. Patent No. 6,815,309), applicant submits that it is not obvious to use the deposition process disclosed by Letertre et al. to replace the bonding process disclosed by both Kub et al.

Applicant submits that both Kub et al. and Letertre et al. disclose a bonding process between a donor substrate and a support substrate. Letertre et al. further discloses that the support substrate can be produced by a deposition process before bonding (Col. 6 line 67 to Col. 7, line 3).

Applicant submits that the mere mentioning of Letertre et al. that the support substrate can be produced by CVD before bonding to the donor substrate is not enough

motivation for a person skilled in the art to employ deposition method to replace the bonding method.

With respect to the rejection of claim 17 under 35 U.S.C. §103(a) as being unpatentable over Kub et al. and Letertre et al. as applied to claim 15 above, and further in view of Lam et al., applicant submits that claim 17 is a dependent claim, thus should be allowable, at least for the reason stated above with respect to the independent claim 15.

In conclusion, applicants respectfully submit that in view of the amendments and arguments set forth herein, the applicable rejections have been overcome.

Pursuant to 37 C.F.R. § 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. §§ 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: December 7, 2006

Tue Nguyen
Reg. No. 53,390

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8300